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Notice.—The next issue will be devoted to Surgery.

This Issue contains the Twelfth Section of Vol. II of the History of Veterinary Literature by Major-General Sir Frederick Smith, K.C.M.G., C.B., F.R.C.V.S.

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THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science.

Editor:

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,

HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING,
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HONORARY MEMBER OF THE AMERICAN VETERINARY ASSOCIATION,
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Sub-Editor:

GLADSTONE MAYALL, M.R.C.V.S.

MAY, 1924.

Editorial

THE CAUSE OF FOOT-AND-MOUTH DISEASE.

ACCORDING to the April issue of the *Berliner Tierärtzliche Wochenschrift*, a communication was made to the Berlin Microbiological Society on April 7th last, at a meeting held in the Hygienic Institute of the Veterinary High School, Berlin, in which Herr Dahmer and Dr. Frosch claim to have discovered the causal organism of foot-and-mouth disease by the aid of a special photographic apparatus constructed by Kohler of Jena.

By a special method of working the organism can be separated from the aphthous fluid and cultivated on nutrient media, being able to be reproduced with active and virulent properties for several succeeding generations. From cultures it is stated to be possible to reproduce foot-and-mouth disease in its typical form in susceptible animals.

The name of *Loeffleria nevermanni* has been given to the organism —the former word in honour of *Löffler*, for the work he has done in connection with the filtrable viruses; the latter word in honour of *Nevermann*, because he has specially interested himself in the investigation and fight against foot-and-mouth disease and in the perfecting of *Kohler's* ultraphotographic apparatus.

The confirmation of this discovery will be awaited with interest in all countries, and particularly with us in Great Britain at the present moment. Another report has reached us from Utrecht, where a considerable amount of experimental research work has been done by Professor Pfeiler, a German, in collaboration with the Dutch Veterinary Authorities. At no time in the history of outbreaks of this disease has more earnest attention been paid to laboratory and

field experiments to discover a method of prophylaxis. It is an opportunity for our veterinary workers and thinkers, clinical as well as bacteriological, to show the world what a scientific training can do; and if successful, it is more than probable that their findings will benefit mankind quite as much as the lower animals. Measles, scarlatina, and influenza of man, to mention only three of the numerous groups whose causal organism still baffles the workers in human medicine, are surmised to belong to the ultra-visible virus group, in the category of which the veterinary bacteriologist places several of his chief bugbears, including foot-and-mouth disease and distemper.

THE CONTROL OF BIOLOGICAL PRODUCTS IN AMERICA.

JUST as in Great Britain at the present time an effort is being made by the National Veterinary Association and other medical bodies to urge upon Parliament the necessity for control over the present unrestricted sale of certain biological products—especially tuberculin—so have veterinarians and medical men in other countries been for some time working at the same object; and in the United States of America considerable headway has already been made. For example, by the courtesy of the Editor of the *Journal of the American Veterinary Medical Association*, we have received a copy of the laws on the subject enforced by the Minnesota State Live Stock Sanitary Board since January 1921, recently (1923) amended and strengthened, so that the title heading now reads, "A Bill for an Act relating to the manufacture, sale, warehousing, handling, dispensation, distribution and use of hog cholera serum, virulent blood, virus, and other biological products for use upon domestic animals"; and the fine for warehousing, handling, selling or distributing biological products relating to the domesticated animals without a duly authorised licence is 5,000 dollars. The great work might be helped forward by collaboration between each of the two great English-speaking communities.

OUTBREAK OF FOOT-AND-MOUTH DISEASE IN CALIFORNIA.

AN outbreak of foot-and-mouth disease has made its appearance in California and is giving great anxiety to the authorities, not only of the American continent, but also to the countries whose vessels do a direct trade from there. Japan and islands such as those of Hawaii have tightened up their animal quarantine regulations, and the strictest veterinary inspection of all animals is made a *sine qua non* before landing is allowed to take place.

XUM

The prominent articles given to this subject by our contemporaries, the *North American Veterinarian* and *Veterinary Medicine*, are interesting reading, and the precautions taken by the authorities illustrate clearly the great dread which this disease at once inspires in the minds of the agricultural community and the necessity for, and great value of, a proper scientific Veterinary Department. It is gratifying, too, to us in Great Britain to find that the only method advocated and resorted to is the one which our Veterinary Department follow out here, i.e. the radical slaughter system. Brutally crude as it may seem, it is economically sound in principle, and it must have been a source of relief and gratification to Sir Stewart Stockman and his colleagues to see how unanimously the various branches of the National Veterinary Association followed the lead of the Central Society and cordially gave him their loyal support in whatever policy he thought fit to advise.

California is following the same plan, and in alluding to the steps taken to get the present outbreak in Great Britain under control. the editor of the *North American Veterinarian* says: "In most European countries foot-and-mouth disease has gained such a foothold that it has probably become a permanent infection. Great Britain has fought off many outbreaks and is now engaged in one of the hardest fights to protect its livestock from the scourge." The disease is supposed to have had its origin through the feeding of garbage to hogs from steamers arriving from foreign ports, and to have started in Solano County, where it speedily spread to the two adjoining counties of Contra Costa and Alameda.

Up to March 15th some 12,154 animals, including over 3,000 cattle and 8,000 pigs, had been destroyed and buried. Very stringent regulations are in force, including one dealing with sera and viruses, which might well be copied by our authorities here, forbidding the use of any new stock preparations of this kind, and ordering all sera and viruses in the quarantined area to be submitted to stringent purity tests.

The importance of this precaution is shown by the statement that the outbreaks in the United States in 1902 and 1908 were introduced by the use of certain biological products. It makes one wonder whether, knowing that there is an unrestricted sale of tuberculin and other biological products obtained from countries where foot-and-mouth disease is indigenous, this might not explain some of our inexplicable outbreaks here. The secret use of some of these biological products by unqualified persons has become a scandal of sufficient importance for the National Veterinary Association to appoint a committee of experts to investigate and report upon the question.

General Articles

THE RELATION OF INTERNAL SECRETION TO REPRODUCTION AND GROWTH IN THE DOMESTIC FOWL.

By LANCELOT T. HOGBEN, M.A. (Cantab.), D.Sc. (Lond.),
Animal Breeding Research Department, University of Edinburgh.

II

The Parenteral Administration of Certain Endocrine Extracts.

The present paper records further experiments on the relation of internal secretion to the reproductive cycle of the domestic fowl, following the lines indicated in the previous contribution of the series (Crew and Huxley). The primary object of this investigation was to elucidate any possible effects—microscopical or otherwise—produced upon the gonads by continuous intraperitoneal injection of certain endocrine extracts prior to sexual maturity. The substances administered were corpus luteum, pituitary (anterior lobe), and adrenal cortex. Pearl (1915–16) has already recorded negative effects of pituitary feeding in the activation of the resting or immature ovary of the fowl, in opposition to the claim put forward by Clarke (1915), who described increased egg production induced by such treatment. Pearl himself, however, records the inhibition of ovulation by injection of large doses of corpus luteum extract, though feeding with the fresh tissue was not efficacious. More recently Stein and Hermann (1920) have described a striking retardation in the sexual development of the male rat after intraperitoneal treatment with luteal extracts. In view of Miss Hewer's recent note setting forth certain effects upon the interstitial cells of ovary and testes in the rat induced by injections of cortical extracts of adrenal gland, it was decided to attempt a confirmation of her observations, using the fowl as experimental material.

In these experiments the desiccated extracts supplied by the Armour Organo-therapeutic Laboratory in tablet form were made up in Ringer's solution to such a strength that each bird received at one injection 0·05 grain fresh tissue substance. In the experiment fifty-two birds were employed, all of the same hatch—the offspring of a Rhode Island Red ♂ × Light Sussex ♀ cross, and hence of recognisable sex at birth by the sex-linked plumage colour. Four sets of thirteen each, comprising eight pullets and five cockerels, were treated as follows: (*a*) not injected; (*b*) injected with anterior lobe extract (intraperitoneal); (*c*) injected with adrenal cortex; (*d*) injected with

corpus luteum extract. Feeding was identical in all cases, and the chicks were kept in the open, for the first few weeks in a common brooder and run, and afterwards at large. The injections began three weeks after hatching, were made three times a week, and continued over a period of eight weeks, at the conclusion of which the birds were killed for micro- and macroscopic examination of the gonads and ductless glands. These were fixed in Allen's chromic-urea modificate of Bouin's formula at blood t°.

Condition of the Gonads.

The gonads of the domestic fowl in both sexes display little change between the age of three weeks after hatching and a few weeks before the onset of sexual maturity. Histologically there is no significant difference between the ovaries and testes of a four-months-old bird and a chick of three weeks, though there is some increase in bulk, especially in the case of the ovaries, during adolescence. In the cockerel few mitoses are encountered in the testes after the conclusion of a fortnight from hatching. The gonad consists of tubules of spermatogonia with isolated primary spermatocytes in the earlier meiotic stages. But no sign of spermatozoa or spermatocyte mitoses are ever found during the first three months of life in the fowl. Between the tubules are islets of epithelial elements, the so-called lutear cells believed by Morgan to be confined to the henny-feathered varieties, but since shown by Pease to occur at least in young birds of any strain. In neither of these respects was there any difference between the cockerel of three months or three weeks; nor was there any recognisable distinction between the histological picture presented by the testis of the male birds of the injected and of the control series at the termination of the experiment. Both germinal and epithelial constituents were precisely comparable and remarkably uniform. The same was true of the ovaries during the period of the experiment. The ovary both of the three-weeks chick and the pullet of three to four months consists of oocytes in the growth phase, "lutear cells" and stroma. The oocytes are of various sizes, with large nuclei and chromatin filaments, showing very characteristic chiasmas in the diplotene stage. Up to the age when the experiment was brought to an end, the growth of the ovary is accomplished by the successive enlargement of oocytes previously differentiated in embryonic life, when alone the early synaptic stages are seen. But the actual deposition of yolk does not appear to begin until very shortly before laying. After eight weeks' injection the ovaries of the birds in each series were about twice or three times as large as

those of the three-week chicks. There was, however, no appreciable difference between the size of the ovaries in the injected and non-injected birds; nor was the histological structure of the ovary distinguishable in the four series either with respect to the germinal or epithelial components.

The histological data derived from the experiment thus confirm and extend the failure of Pearl to activate the resting ovary of the fowl by pituitary administration. They do not, on the other hand, confirm the observations regarding the effect of corpus luteum and adrenal cortex administration on the generative organs of the mammals as set forth by Miss Hewer and by Stein and Hermann.

GROWTH.

For the first six weeks each bird was weighed individually. The weekly weights are set forth in the accompanying tables, also giving the final initial weight ratio in the case of each bird. The accompanying graph indicates the variation in the average weekly weight of each bird, suggesting a decided retardation in the case of the series injected respectively with extracts of pituitary anterior lobe and adrenal cortex.*

From Table II, giving approximate values of the statistical constants, it will be seen that taking $\cdot 6745\sqrt{\sigma^2_{m_1} + \sigma^2_{m_2}}$ as the probable error of the mean difference between the final/initial weight ratios for control and experimental series, there is no significant difference between the mean final/initial weight ratio for the control and luteal series, and control and prepituitary series; the difference (negative in both cases) is within the standard deviation in the former instance, and only slightly more in the latter case. The adrenal cortex series give a mean ratio which is less than the control ratio by an amount equivalent to roughly two and a half times the standard deviation, or nearly four times the probable error, which may be regarded as significant. Reference to the weight chart reveals at once the reason why the difference between the mean weekly growth rate of the pituitary and control birds is relatively greater than the difference between the final/initial weight ratios, and suggests that after a preliminary retardation a decided acceleration of growth had begun. This Brailsford Robertson claims to have proved in the case of mammals, and possibly it accounts for the remarkable discrepancy between the testimony of a large number of workers who have tested pituitary administration in relation to growth in mammals and birds. The majority of workers have reported either negative evidence or

* In each series one bird died during the course of the investigation.

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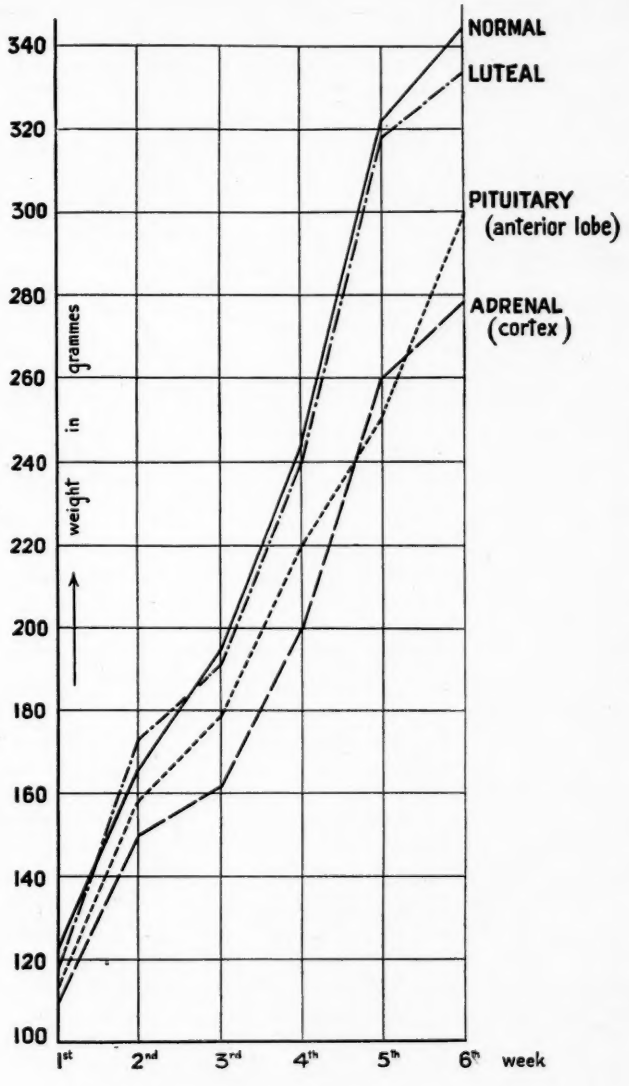
NORMAL
LUTEAL
PITUITARY
(anterior lobe)
ADRENAL
(cortex)
weight in grammes
340
320
300
280
260
240
220
200
180
160
140
120
100
1st
2nd
3rd
4th
5th
6th
week

TABLE I.

Animal.	Initial Weight (nearest gm.).	Second Week	Third Week.	Fourth Week.	Fifth Week.	Sixth Week.	Mean Weekly Increase per Unit Weight.
			SERIES A (UNINJECTED).				(*a*)
50 ♂	101	146	168	222	283	301	0·25
51 ♂	159	193	241	283	371	399	0·20
52 ♂	124	196	228	283	380	402	0·27
53 ♀	135	184	200	247	330	336	0·21
54 ♂	101	138	162	205	269	298	0·25
55 ♀	124	170	189	232	303	325	0·22
57 ♀	133	209	198	234	332	350	0·23
58 ♀	135	178	193	254	326	356	0·22
59 ♀	100	147	172	219	284	298	0·25
60 ♀	118	178	187	245	314	325	0·26
61 ♀	126	174	205	269	356	388	0·26
62 ♂	107	159	180	238	324	350	0·28
			SERIES B (CORPUS LUTEUM).				(*b*)
81 ♀	109	136	142	194	246	258	0·19
82 ♂	145	210	228	297	405	390	0·23
83 ♀	91	131	155	201	264	287	0·26
84 ♀	151	238	263	318	407	428	0·25
85 ♀	113	169	195	238	315	332	0·25
86 ♀	97	145	174	211	273	290	0·25
87 ♀	118	174	188	249	322	353	0·25
88 ♀	95	131	139	164	215	236	0·21
89 ♀	126	183	197	241	314	323	0·22
90 ♂	97	122	129	167	218	228	0·19
91 ♂	155	232	271	349	476	479	0·27
92 ♂	158	206	229	270	372	388	0·20
			SERIES C (ANTERIOR LOBE).				(*c*)
1 ♂	88	131	139	175	239	247	0·24
2 ♀	100	144	149	186	239	261	0·22
3 ♂	125	196	219	278	268	290	0·20
5 ♂	109	150	166	216	287	310	0·24
6 ♀	125	167	171	228	288	331	0·22
7 ♀	107	153	172	228	292	302	0·24
8 ♀	108	129	135	182	322	356	0·18
9 ♀	127	182	192	223	291	303	0·20
10 ♀	133	171	251	251	312	332	0·21
11 ♂	108	132	196	200	272	300	0·22
12 ♀	118	172	188	244	318	346	0·25
13 ♀	116	174	186	247	297	319	0·23
			SERIES D (SUPRARENAL CORTEX).				(*d*)
20 ♂	151	223	277	304	412	420	0·24
21 ♀	123	177	196	243	309	331	0·23
22 ♂	104	132	133	164	217	241	0·19
23 ♀	98	116	123	165	211	222	0·18
24 ♂	100	137	151	194	252	277	0·23
25 ♀	89	125	223	138	183	203	0·25
26 ♀	141	197	200	260	332	359	0·22
27 ♂	95	141	148	199	258	258	0·23
29 ♀	95	137	150	186	231	253	0·23
30 ♂	94	107	110	125	153	161	0·12
31 ♀	123	170	204	253	333	352	0·24
32 ♀	95	128	140	182	234	252	0·22

a slight retardation; Pearl and Wulzen both arrive at the latter conclusion with respect to the Fowl. The former claims that corpus luteum feeding results in a greater inhibition. These data are not consonant with Pearl's observations under that heading, and it is worth noting that Pearl was not able to reproduce by feeding the inhibiting action on the ovary which he attributed to intraperitoneal injection of luteal extract. The particulars given with respect to adrenal cortex do not, to the author's knowledge, come within the scope of previous investigation, and might encourage further study.

TABLE II.

Series.	Final/Initial Weight.	Mean of Series.	Standard Deviation of Series.	Standard Deviation of Mean Series.
A (Uninjected) ..	0·0, 2·5, 3·2, 2·5, 2·9, 2·6 2·6, 2·6, 3·0, 2·8, 3·1, 3·3	2·8	$\sqrt{0\cdot074}$	$\sqrt{0\cdot006}$
B (Corpus luteum)	2·4, 3·0, 3·1, 2·9, 2·9, 3·0 3·0, 2·5, 2·6, 2·3, 3·1, 2·5	2·7	$\sqrt{0\cdot074}$	$\sqrt{0\cdot006}$
C (Prepituitary)..	2·8, 2·6, 2·3, 2·8, 2·6, 2·8 3·3, 2·4, 2·5, 2·8, 2·9, 2·7	2·7	$\sqrt{0\cdot059}$	$\sqrt{0\cdot005}$
D (Adrenal cortex)*	2·8, 2·7, 2·3, 2·3, 2·7, 2·3 2·5, 2·7, 2·7, 1·7, 2·9, 2·7	2·5	$\sqrt{0\cdot10}$	$\sqrt{0\cdot009}$

* Assuming the legitimacy of applying the normal frequency distribution to a comparatively small number of data and the acceptability of the final/initial weight ratio as a measure of growth, reference to Shepperd's tables gives for $\int_{-0}^{2\cdot5} \phi(x)\,dx$, $\frac{1}{2}(1+a) = 0\cdot9937903$, so that the odds are approximately 80 : 1 against the lower mean of the adrenal cortex series being due to random sampling.

Conclusion.

The results of the present investigation are mainly negative, and may be summarised as follows :—

(1) After two months' intraperitoneal injection with desiccated extracts of corpus luteum, suprarenal cortex and pituitary (anterior lobe), no effects on the histological character of the ovaries of the growing chicks were observed.

(2) Weight records indicate a slight but probably significant retardation in the case of the birds injected with adrenal cortex extract, but not so in the series which received prepituitary and luteal preparations.

In neither respect do the results obtained appear to harmonise with the clinical indications. This is especially interesting in the case of the pituitary and the association of pituitary disorder with dystrophia adiposogenitalis. It may be that the anterior lobe operates

in the metabolism of the organism in some other way than by internal secretion, and apart from recent developments in amphibian endocrinology there is certainly no satisfying evidence that such is not the case. However, the failure of pituitary administration to accelerate sexual development does not imply this conclusion necessarily. In fact, there are at least four additional possibilities to consider. These are: (*a*) that the anterior lobe secretes something which is complementary to the activity of the sex gland, so that the consequence of pituitary deficiency would only come into play at the normal period of "secondary activation" (puberty); (*b*) that in any case there is an "optimum" of pituitary secretion beyond which point further addition would retard rather than stimulate; (*c*) that the administration of extracts over long intervals, even in comparatively large doses, does not adequately reproduce the effect of continuous addition of minute quantities to the circulation; (*d*) that the prepituitary autacoid, if it exists, is relatively unstable in the body (like adrenalin), so that its effects can only be manifested experimentally by intravenous administration. As regards the last possibility, it is to be regretted that continuous intravenous injection over a protracted period is extremely inconvenient; and there is no apparent method of exploring the penultimate possibility indicated above. The first two, however, suggest that in future a critical experimentation on the activity of the pituitary anterior lobe should be conducted by administration to animals in which pituitary deficiency had been previously induced. This consideration might lead to a more harmonious relation between the clinical and experimental evidence, especially in view of the growth curve and its analogy with the parallel results of thyroid administration. Clinically, hypothyroid infantilism had been remedied by thyroid administration, though such treatment in the normal animal (birds and mammals) either results in retarded growth or no appreciable effect. There is apparently an optimum condition for growth in the case of the thyroid, and the suggestion that there is an optimum basal metabolic rate for growth would bridge the gulf between inquiries on mammals and amphibia, where thyroid deficiency does not retard growth *sensu stricto*, though it inhibits the developmental changes at metamorphosis. Now, in the case of the pituitary there is again on the one side the clinical picture of infantilism accompanying prepituitary deficiency, while on the other side the bulk of experimental evidence favours the view that pituitary administration retards growth in the normal individual. Possibly, therefore, the true relation of the pituitary to the abnormal conditions of sexual and bodily development encountered in clinical pictures will only become evident when experiment by administra-

tion and extirpation (partial and complete) are developed hand in hand.

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A NOTE ON THE SERUM AND VACCINE TREATMENT FOR SWINE ERYSIPELAS.

BY MAJOR A. F. CASTLE, F.R.C.V.S.,
Ipswich.

THE attached brief notes and tabulated form on the results obtained with the serum and vaccine treatment of swine erysipelas is forwarded, as the writer considers they may be of interest to practitioners residing in pig-rearing districts where this disease is prevalent.

Prophylactic Treatment.—The injection of serum affords an immunity which persists for about three weeks, but in order to prolong it for the period of six months it is necessary to inject simultaneously vaccine.

	Doses.	
Pig weighing up to 100 lb.	5 cc. serum and	0·5 cc. vaccine
Pig weighing up to 100 to 150 lb. . . .	8 cc. serum	idem.
Pig weighing up to 150 lb. and upwards . .	10 cc. serum	idem.

If it is necessary to establish an immunity for the period of twelve months, as in the case of breeding pigs, a second injection of $\frac{1}{2}$ c.c. of vaccine alone should be administered eight to ten days after the sero-vaccination.

Curative Treatment.—When swine erysipelas serum is employed early in the treatment of the disease it is invariably successful; the dose of same should be double that above indicated as a prophylactic.

When the disease has appeared on a farm all the pigs should be injected first with serum alone, in double doses, and eight to ten days later the sero-vaccination of the incontacts should be carried out. In the case of the affected, the latter operation would appear to be unnecessary, as recovery from the disease confers a high degree of immunity.

I formerly injected the serum behind the left ear and then the vaccine at the same site on the right side, but recently I have adopted the injection of the serum and vaccine simultaneously with the same syringe, for which suggestion I am indebted to Professor Gaiger, Animal Diseases Research Association. The serum and vaccine used

in the outbreaks mentioned in this note have been obtained from the Serum Laboratory, Antwerp. I enclose a copy of instructions issued with same.

The majority of the affected pigs show marked improvement after the third or fourth day following the injection of serum, but in isolated cases a few may evince marked stiffness and symptoms of carpal and tarsal arthritis and inflammation of the flexor sheaths for some weeks after treatment. In the case of incontacts which receive vaccine at the second injection, if, as occasionally happens, one or more pigs appear to be considerably inconvenienced and seriously ill as a result of the vaccine, I have again administered serum in single doses, and although usually twelve days after the first injection of serum, in no case have symptoms of anaphylaxis been noted; this procedure has been followed by favourable results.

All the affected, when treated with serum, appear to regain weight in a remarkable manner a few weeks subsequent to the attack.

I have quite recently treated a herd numbering 91 pigs, in which 20 animals have been kept as controls; 71 have received serum in double doses, and 15 of this number have subsequently received the usual sero-vaccination treatment. I hope to report the results of this experiment in a later note. The affected in this herd numbered 25. It will be noted that, unfortunately, swine erysipelas is never so rampant in the colder months of the year, and thus the incontacts that received only the serum in double doses, thus conferring a passive immunity for the brief period of three weeks, may not contract the disease, although living in the same sheds as formerly.

The pigs are separated in six lots as under:—

Pen No. A	16 and	1 control
Pen No. B	16 and	1 ,,
Pen No. C	10 and	2 ,,
Pen No. D	14 and	1 ,,
Pen No. E	15 and	— ,,
Pen No. F	— and	15 ,,
	71	20

All these pigs are in the same shed, but divided up in six pens. They are all fed by the same stockman. It will be seen there are virtually only 5 controls, as in Pen F the 15 pigs are completely separated from the other members of the herd, and as urine and fæces are credited with being the chief source of infection, unless the stockman act as carrier in conveying the infection on his boots or clothing, or unless the food contains the infection, it is not readily

Affected.					In contacts.			Controls.					Remarks.
Outbreak Number.	Number Affected.	Number Treated.	Number Died.	Recovered.	Number Treated.	Slaughtered.	Died.	Number.	Died.	Subsequently Affected and Recovered.	Permanent Unaffected.	Subsequently Affected and Destroyed.	
1	2	2	—	2	7	—	—	—	—	—	—	—	
2	10	10	—	10	37	—	—	2	1	—	—	1*	
3	15	15	—	15	—	35	—	4	2	2†	—	—	
4	16	16	—	16	75	—	1‡	1	1	—	—	—	
5	6	6	1§	5	—	42	—	—	—	—	—	—	
6	6	5	1‖	5	—	24	—	—	—	—	—	—	
7	36	36	—	36	—	119	—	—	—	—	—	—	
8	18	18	—	18	—	123	—	—	—	—	—	—	
9	1	1	—	1	—	6	—	—	—	—	—	—	
10	3	3	—	3	11	—	—	—	—	—	—	—	
11	6	6	—	6	—	54	—	—	—	—	—	—	
Totals	119	118	2	117	130	403	1	7	4	2	—	1	

* The second control pig to become affected, but which did not actually die, was destroyed, as it became permanently affected with post-paraplegia and chronic arthritis affecting both carpal articulations.

† The two controls which subsequently became affected suffered permanently from cardiac disorder, which was verified post mortem. I therefore show them as recovered, as they were not destroyed until weighing nearly 10 stone each.

‡ The incontact animal that died after the sero-vaccination treatment was a 9-stone pig and developed symptoms subsequent to the vaccination.

§ This pig, a large black, was *in extremis* and unable to rise when injected with serum, and only survived this operation for two hours. The temperature was 101·5 and the skin showed deep purple discoloration behind the elbows, in the flank, along the floor of the chest and abdomen, in the perineal region; the snout was cyanosed.

‖ This untreated pig died and was virtually a control.
This was an extensive outbreak, but fortunately the majority of the pigs on the farm had been previously killed off, owing to the fact that large store pigs were continually dying from the acute type of the disease. The 56 mentioned were mostly suffering from the mild form of the disease when injected. This outbreak occurred soon after the removal of manure from the yards in which the pigs were accommodated.

understood why these animals should contract the disease, as it is recognised that the disease is not air-borne.

The drainage system in the shed, however, leaves much to be desired, and possibly the percolation of urine and liquid fæces from the adjacent pens on either side of Pen F may be sufficient to set up infection in this pen.

Originally it was intended to subject the whole of the 71 pigs, other than the actually affected, to the sero-vaccination, but as none of the 25 affected died after the serum injection, the owner preferred to have only 15 pigs in Pen E treated in this manner. This was accordingly carried out ten days after the first injection had been given.

The 25 affected are mixed with other members in Pens A, B, C, and D as indicated. It will be noted, however, that the 5 controls are incontact with a number of the 25 affected pigs in Pens A, B, C, and D, as each of these pens contain affected and a number of in-contact which have not been clinically affected. All these received double doses of serum only, and have not been subsequently vaccinated.

AN IDEA FOR PREVENTING HORSES FROM NEIGHING.

By E. MORGAN, F.R.C.V.S., D.V.H.,
Puerto Cabello, Venezuela.

A CAPTAIN of the Venezuelan Army informs me, during the last war between Venezuela and Colombia, that every night when they were camping and suspicious of being within hearing distance of the enemy, they tied stones of several pounds' weight to their horses' tails so as to prevent them from neighing (all these horses are undocked), the idea being, more or less, similar to the one of tying the wings of the roosters, because the horse has a peculiar habit of elevating its tail at the time of neighing, which he utters mainly by way of the nostrils; especially "the neigh of pleasure," as Sir Frederick Smith calls it. Compare him with the donkey, who so well sings a solo in the field, with a full *crescendo*, rolling and ending, as you know, in a tender *rallentando*, with his mouth wide open like an alligator when basking in the sun on the sands of a river bank.

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Clinical Articles

RUPTURE OF THE DIAPHRAGM IN A MARE.

By T. G. BROWNE, M.R.C.V.S.,
Professor of Anatomy, Veterinary College of Ireland, Dublin.

Subject.

An aged brown mare, about thirteen hands, appeared to have been used for hackney work.

History.

The mare was obtained from a local knacker three days previous to destruction, and during this period nothing amiss was observed except that the animal was very thin and debilitated. A thorough examination was not made prior to destruction, since nothing abnormal was suspected, but there was certainly no respiratory distress, and no untoward symptoms were observed when the animal was brought to the College immediately after having walked across the city.

Destruction was carried out by bleeding through one of the common carotid arteries while under the influence of a general anæsthetic (chloroform). As a rule animals suffering from lung affections, or any condition causing respiratory distress, collapse abnormally quickly by this method of destruction, but in this case the animal bled out normally and did not expire unusually rapidly.

Autopsy.

The carcase was used as a dissection subject. On opening into the peritoneal cavity by a median and transverse incisions in the abdominal wall, an upward-projecting border of what appeared to be a flap of the left portion of the diaphragm presented itself below the stomach. The latter organ was further removed from the abdominal floor than usual, and appeared to lie above and in front of this, as yet presumed, flap. No coils of the small intestine were at first visible, but when the double colon and cæcum were drawn aside it was found that a large proportion of the jejunum and ileum as well as a few coils of the floating colon had disappeared by extending in front of the above-mentioned border. On further examination it was revealed that this border was simply the lower boundary of a large elliptical-shaped opening in the left portion of the diaphragm, involving both the tendinous centre and the muscular rim (see No. 1 in the photograph). This opening measured 12 inches by 9; its long axis extended obliquely upwards and to the left from near the hiatus œsophagi to a point within 2 inches from

the attachment of the diaphragm to the fifteenth rib. The border of the opening was rounded smooth and regular and free from adhesions, and at some parts the pleura and peritoneum appeared to have here become blended; this was particularly apparent at its upper part, where the parietal surface of the spleen had evidently lain closely against it and thus rendered this part of the border very smooth and markedly concave; in fact, the entire border of the opening presented every indication that the lesion was of some standing. Indications of a chronic peritonitis were apparent in the neighbourhood of the opening as well as on the anterior surface of the stomach, but since evidence of a chronic peritonitis of a greater or lesser degree is not an uncommon post-mortem finding in old horses which have been apparently normal, one cannot attribute any special significance to such a condition of the peritoneum in this case. Stretching from the upper border of the opening to the upper border of the left lateral lobe of the liver was a free strip of membrane, apparently a portion of the left lateral ligament of the liver, which, it would appear, had become split when the rupture of the diaphragm occurred. The middle of this strip was thickened, and it here contained between its two layers a mass of black material, evidently the remains of an old blood-clot. The stomach and lower portion of the spleen had been carried upwards and forwards, and were accommodated in the left pleural cavity immediately in front of the opening. The base of the spleen, however, maintained its normal position and attachment, so that its parietal surface was brought into close contact with the left part of the upper border of the opening, which thus caused an impression on this surface of the organ in the form of a nearly transverse groove at the junction of its middle and upper thirds. The greater part of the small intestine, as well as a few coils of the small colon, had also passed through the opening into the chest, so that a large proportion of the great mesentery and a part of the small mesentery extended through the opening from their attachments at the abdominal roof to their corresponding portions of the bowel in the chest.

It may be advocated that this migration of the bowel from the abdomen to the chest had taken place either at the time of or soon after death, but if this explanation can be accepted at all, it can only be so in part, since a portion of the great mesentery presented evidence of partial strangulation which undoubtedly was not of recent origin, and the mediastinal septum presented two openings of some standing through which coils of bowel had passed.

The partially strangulated portion of the mesentery included an area 4 or 5 feet long, in which were two dark-red patches and

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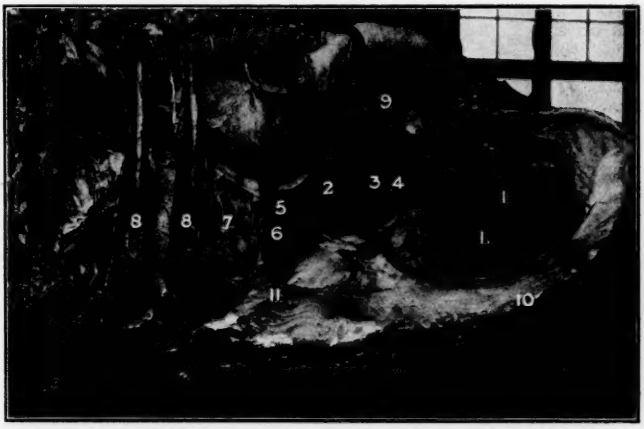
several smaller ones, evidently the remains of hæmorrhages between its layers. Furthermore, this part of the mesentery contained thickened patches immediately above the intestine, due to the deposition of fibrin between its layers, and its surface was here rough and thready, indicating the presence of a chronic peritonitis.

On opening into the chest by removing the left chest wall it was found that the posterior part of the mediastinal septum had been perforated by two openings (see Nos. 2 and 3 in the photograph). One was much the larger, nearly as large as that in the diaphragm, and it involved all that part of the posterior mediastinal septum from the attachment of the pulmonary ligament to within 5 inches



Left chest wall has been removed and the left lung reflected upwards after removal of the abdominal viscera.

1. Opening in diaphragm.
2. Larger opening in mediastinal septum.
3. Smaller opening in mediastinal septum.
4. Œsophagus.
5. Left phrenic nerve.
6. Posterior vena cava and right phrenic nerve as seen through opening.
7. Pericardium.
8. Third and fourth ribs.
9. Left lung reflected upwards.
10. Cut extremities of ribs.
11. Mediastinal septum behind heart.

from the floor of the chest (see No. 2 in the photograph). The left phrenic nerve was still intact, however, and stretched across the larger opening (see No. 5 in the photograph), while the posterior vena cava and the right phrenic nerve could be seen through this opening in their normal positions in the right side (see No. 6 in the photograph). The smaller opening was only about 4 inches in diameter, and was placed immediately in front of the diaphragm below the terminal portion of the œsophagus (see No. 3 in the photograph). The abdominal viscera having been removed before the chest was opened, the extent and positions of the herniated portions of the bowel were not definitely ascertained, but there could be no doubt

that not only did they occupy the left pleural cavity, but that many coils must have extended through the openings in the mediastinal septum into the right side. Furthermore, it would seem reasonable to assume that the partially strangulated portion of the great mesentery and small intestine was that which had extended through the smaller opening.

That portion of the mediastinal septum which remained intact behind the heart (see No. 11 in the photograph) did not present the usual delicate lace-like character found in old horses, but was thickened and showed thready deposits on its surface, due to a deposition of fibrin. The pleura was otherwise normal, presenting no further evidence of pleurisy, but it carried a few dark-red patches which on closer inspection proved to be only the remains of blood-clots on the surface.

The lungs as seen in the collapsed condition were normal, but the lower aspect of the right was somewhat deformed, showing evidence of pressure caused by the herniated bowel in the chest.

Many cases of ruptured diaphragm have been recorded from time to time, especially in the horse and dog, usually resulting from accidents, and in these cases untoward symptoms of a more or less marked degree, especially those of colic and respiratory derangement, were always in evidence from the time of the accident, but in the case under review no such symptoms were apparent.

According to Cadeac, a condition of the diaphragm similar to that here described may be of congenital origin in a large proportion of cases, and when this is the case the opening is usually situated at the line of junction of the tendinous centre with the muscular rim, and its borders are thick, smooth, regular and free from adhesions, while in cases of accidental rupture the lesion may occur in any part of the structure, but more commonly in the tendinous centre, and its borders are more or less irregular, having a lacerated appearance, and if recent they show intense congestion and are blood-stained; but if of long-standing adhesions with the viscera passing through are formed. According to these distinctions between the congenital and the accidental lesion the condition of the opening in this case would appear to suggest that it was of congenital origin except for the fact that it involved both the tendinous centre and the muscular rim. If this explanation be accepted, however, it would seem difficult to believe that this animal could have been sufficiently useful to justify it being allowed to live to an old age.

The accompanying photograph shows the openings in the diaphragm and mediastinal septum, the left chest wall having been removed and the left lung reflected upwards.

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HAIRBALL IN THE ŒSOPHAGUS OF A CAT.

By E. L. BUTTERS, M.R.C.V.S.,
Liverpool.

I was called to see a blue Persian cat which was reported to be in difficulties with its breathing and showing acute symptoms of choking. The owner stated that it had been unwell for about a month, but from its condition I surmised that it had been able to take liquid food. Seeing that it was in great distress, and choking very badly, I obtained the owner's permission to destroy it with chloroform.

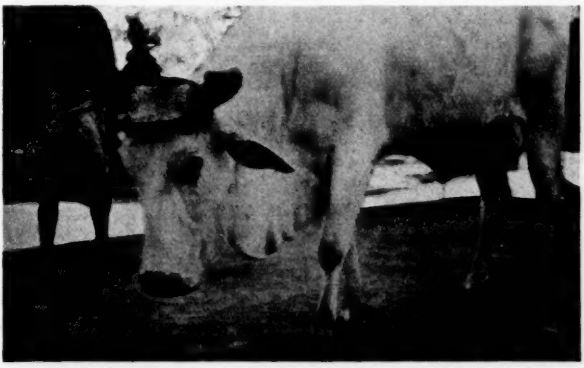
Post-mortem showed enormous dilation of the œsophagus, which contained a mass of the hair of the coat as large as a big walnut. It was situated just in front of the two first ribs, and could neither be passed up or down. Its size and position make it, I think, worthy of putting on record.

LACTATION IN A BULLOCK.

By L. M. HIRA,
Final Year Student, Bombay Veterinary College.

A bullock of the Malvi breed belonging to the Bombay Municipality was brought to the Hospital of the Bombay Veterinary College in December 1923 for clinical demonstration.

The case was a very interesting one by reason of the bullock's having, in addition to the male genital organs, a well-developed udder



with four rudimentary teats. The bullock yields milk throughout the year from all the four teats, to the extent of two to four ounces twice daily.

It will be seen from the photograph that the animal has been mulled,* and that the sheath is quite prominent, while the udder is as well developed as in many milch cows, the teats also being fairly large. Female genital organs are entirely absent.

* Mulling is a method of castration by beating between boards, practised by Indian unqualified castrators.

NECROTIC ABOMASITIS IN CATTLE.

By J. A GRIFFITHS, F.R.C.V.S.,
Chief Veterinary Officer, Nyasaland.

Necrosis of the abomasum is a condition which is not uncommon in cases of poisoning by irritant inorganic poisons, such as arsenic, but the records of this condition being a cause of death, where the presence of any one of these irritants cannot be demonstrated by chemical analysis, are not frequent in modern veterinary literature.

The writer was recently called upon to investigate the cause of deaths among the yearling heifers belonging to a planter in the Highlands of Nyasaland. At the time of the investigation four animals had died and two others were reported to be ill and showing similar symptoms to the others. Arsenical poisoning was suspected, as two of the animals had died within forty-eight hours of being dipped in an arsenical dipping solution.

When the place was visited one of the animals previously reported sick had been dead for over eight hours, and the other went down each time the herd stopped, but would get up when approached and walk off. There was no emaciation or signs of diarrhœa—in fact, the herdman stated that the bowels were not acting. The animal which was dead was very much distended, and post-mortem changes amounting to fairly advanced decomposition had already taken place.

The sick animal's temperature was 104·8° F., and the respirations very little faster than normal. Slaughter was decided as being the most economic means of disposal as well as giving the best conditions for arriving at a correct diagnosis. The animal was bled to death. The subcutaneous tissues, thoracic organs and tissues, as well as the liver, spleen, pancreas, kidneys and bladder did not show any microscopic abnormality. The condition of the abomasum could be seen as soon as the abdominal wall and sternum were removed. The necrotic muscular tissues of the abomasum showing as a blackened patch, 6 inches in diameter, through the peritoneum, in which a localised peritonitis, confined to the area around the abomasum, had commenced. The abomasum was cut into and its contents were removed, these consisting of a small quantity of stinking necrotic débris which, together with the walls of the abomasum, including the portion containing the lesion, were removed for chemical analysis. The mucous membrane of the small intestine, the cæcum and the colon presented no abnormality, although they were devoid of solid alimentary material, there being only a small amount of semi-fluid contents, mainly confined to the cæcum.

The Government Chemist (Mr. A. J. W. Hornby, B.Sc.) reported that there was no inorganic poison present, even the usual trace of

arsenic present in all animals which are being regularly dipped being absent.

Bacteriological examination of the lesion revealed the presence of B. necrosis, the edges of the lesion showing a gradual extension of the necrotic process.

A similar condition was found in the other animal, which was dead at the time the above examination was made, and the owner stated that he had noted similar lesions in the other four animals which had died.

The causes which might give rise to such lesions in the absence of irritant inorganic poisons are rather obscure. There is the condition in which the acid of the gastric juice may, in abnormal circumstances, give rise to a pathological condition which presents an opportunity for bacterial organisms to aggravate the primary damage, and in this way give rise to the lesions described above.

Traumatic injuries, such as might be caused by stumps of trees or injuries due to blows, horning, kicks, etc., might also set up a similar condition, as well as such foreign bodies as nails, pieces of wire, etc., although it is difficult to believe that any of these could pass through the reticulum and the omasum without causing lesions in those organs. There are, however, a number of plant products, obtained from the roots, bark or leaves of various trees and shrubs, or produced by the action of fungi and other parasites, which are known to have irritant effects and are capable of causing such severe lesions, but if this were the cause in the cases described above, the condition can only rarely occur, as it is inconceivable that cattle, at a time when green fodder was plentiful, would deliberately select as food a material which one would have expected to give rise to lesions in other parts of the alimentary tract, even before it arrived at the more sensitive mucous membranes of the true stomach.

THE TREATMENT OF NODULAR VENEREAL DISEASE IN CATTLE.

By J. F. D. TUTT, M.R.C.V.S., F.L.S., F.Z.S.,
Winchester.

THE clinical symptoms of this disease being fully described in Williams's *Diseases of the Genital Organs in Animals*, I do not propose describing it here.

After experimenting with various remedies, I have found that in practically every case the use of protargol assures a certain cure. At first solutions of protargol were used, and lesions just inside the vulva were painted with it every day and a little injected into the

vagina. The disadvantages were that the action was often localised and not prolonged enough, and the best results have been obtained by the use of protargol sticks,* these being easier to use, more constant as to strength, and, being inserted into the vagina, act on a larger surface and for a more prolonged period than in the case of injections or local applications.

With lesions just inside the vulva, a stick is rubbed over them, after the manner of a caustic, for a few seconds, and then two fresh sticks are inserted as far as practicable into the vagina. The sticks dissolve in about an hour. This is done every second day, and the average time of treatment is about two to three weeks, depending on the severity of the case.

LONGEVITY OF A RABBIT.

By Miss ALEEN CUST, M.R.C.V.S.,
London.

A short time ago I came across an interesting and authenticated instance of longevity in a wild rabbit, which had lived in domesticity for sixteen years, and apparently died of old age, being found dead in its box. It had been captured when only a few weeks old, being at the time on a tuft of grass surrounded by water in a meadow which was flooded, and in which the water was rapidly rising. There were several other little rabbits belonging to the same litter, but these leapt into the water on the approach of the would-be rescuers and were drowned.

This one was fed upon bread-and-milk and such-like food, and eventually became strong and healthy, being made a great pet of by the owner.

A STOCK MANAGER'S OPINION ON FOOT-AND-MOUTH DISEASE IN INDIA.

By W. DAVISON, B.S.A.,
Live Stock Expert in Mysore, Bangalore.

I have watched with a good deal of interest and, I might add, sympathy, the efforts being made by the Veterinary Department in England to stamp out foot-and-mouth disease there for the last few years. Of late, I have leaned to the view that the enormous slaughter of animals in Great Britain is not altogether justified, certainly in view of the fact that the procedure has not apparently been productive of the desired result. How far further spread has been

* The sticks are prepared by the Bayer Company, and are obtainable through their agents (Millwards of Manchester).

prevented is, to the outsider at all events, a matter of conjecture. In India foot-and-mouth disease is always with us in varying degrees of virulence and in different forms. One occasionally sees the disease affect animals so badly that the tongue becomes enormous, protruding out of the mouth and completely filling the buccal cavity. These animals usually die of starvation, as swallowing is impossible, and in fact the introduction of a drench is only possible by means of a syringe, as even a small-necked bottle cannot be forced into the mouth. My own observation has been that when the disease manifests itself in this form, foot lesions are not usually severe, but this may not be the case generally. On the other hand, frequently the foot lesions are present in a great majority. In these cases the treatment is easier. In the establishments here I have a shallow masonry footbath, through which the cattle are driven slowly on their way from water, in which a solution of copper sulphate is kept. This seems to be an effective measure, and I believe that the use of potassium permanganate in drinking water is of use. These, however, cannot be said to be preventative measures, though I believe they keep down the number of seriously affected cases. Under ordinary conditions, when large areas and a change of land are not available, I do not believe it is possible to check the spread of the disease in a herd. Attempts made in that direction have failed with me, and only prolong the period of attack to two or three months. My own belief now is that it pays to mix all cattle together as before, so as to have the attack as simultaneous as possible and get it over. By this method, in a herd of 150 animals some time ago, the outbreak was over in less than four weeks, and the herd clear of disease in two months. Even with a dairy herd this seems to be the best course; though, of course, the milk yield is seriously lowered. This happens, however, in both cases, except that when attempts are made to isolate affected animals the lowering is more gradual and extends over a longer period of time. As it is customary for all Indians to boil milk before using it, and nearly all Europeans follow suit, there is very little danger of the disease attacking humans. I have myself had milk from a herd attacked with foot-and-mouth disease for long periods with no harmful results.

The deaths here do not often exceed 3 per cent., and the greatest danger is a permanent malformation of the feet, which is sometimes very bad and in the case of draft bullocks renders them useless, so that they might as well have died as far as the owner is concerned. Add this kind of loss to the deaths, and I should estimate the total loss at 10 per cent., which does not include slight malformations, such as do not seriously interfere with future usefulness. One attack,

of course, confers no kind of immunity against further attacks. It is generally accepted that the native cattle have much greater powers of resistance than those with European blood in them, although the worst three cases I have seen were pure Mysore bulls.

Our cultivators do not place foot-and-mouth disease very high in the list of important diseases here on account of the low death-rate, and because most of them do not inoculate against rinderpest, anthrax, etc., unless persuaded to do so by the veterinary staff. For my own part, on account of the fact that there is no protection against the disease, I would give it a high place. As a dairyman, or an owner of transport bullocks, perhaps it would come first on the list. In a herd where milk is not produced for sale it is of less importance. In one herd of 250 animals, of which 100 were cows, no cases of abortion occurred during two separate attacks, and in larger herds under my control the number of abortions is low. It is impossible to give accurate figures in the latter cases, as the herds run over large tracts of ground, and records of pregnancy are not kept, but the annual birth-rate is a fair guide to go by.

Translation

PREVENTIVE AND CURATIVE TREATMENT OF FOOT-AND-MOUTH DISEASE.*

(*A paper read at Lyons on November* 19, 1923, *before the South-Eastern Union of Agricultural Syndicates.*)

You have asked me to state my opinion "on the new methods of preserving cattle from foot-and-mouth disease."

These methods are neither new nor sensational, for the principles which recommend themselves are very general principles as regards infectious maladies. We are indebted to Dr. Lebailly of Caen for a systematic study in recent years of one of the processes used against the disease. Lebailly has done much original work in connection with foot-and-mouth disease. He published his technique in 1920, and the Swiss immediately adopted it largely with excellent results. Certain veterinary surgeons in France, Desliens particularly, have treated specifically hundreds of animals and rendered very valuable service to agriculture. To understand these methods and to give you an exact idea of the results one may expect from them it is necessary to call to mind the principal facts known from a study of the disease.

Of clinical symptoms I will tell you nothing: you know them too

* *Revue Vétérinaire*, February 1924.

well. For thirty years France has paid a heavy tribute to this malady, *which simply makes a sport of our sanitary regulations.*

Besides the *benign form* which reveals itself by a crop of aphthæ on elected sites—mouth, udder, feet—and which heals in a few days, there are, as you know, grave and virulent forms. These *severe forms* are often the result of secondary infections by microbes of the soil, which complicate a benign form, and provoke in time mammitis, quittor, and arthritis. But the disease may also assume a grave form at the outset, which quickly kills a large number of sick beasts (malignant form).

The causal agent, the *aphthous virus,* is an insidious microbe which has resisted all efforts of research ; it has not been seen nor cultivated. But one knows where it is hidden ; one knows where one can certainly obtain it in sick animals on condition that one seeks it at a definite period, and this is of practical interest in the evolution of a typical case of aphthous fever. The virus penetrates at first into the mucosa of the foremost digestive or respiratory tracts, aided by some superficial erosion. Very quickly it multiplies there, provoking—contrary to what has hitherto been an article of faith—the formation of an aphtha : *the primary aphtha* which passes unnoticed. Then the fever breaks out, followed by disturbances of general health ; the animal appears to be suffering. Suffering from what ? One does not yet know. But on the morrow diagnosis is plain, for aphthæ (*secondary aphthæ*) appear at the usual sites, and at the same time the eruption occurs, fever declines, and general troubles lessen. The aphthæ grow, the skin covering them falls away ; the little superficial wounds cicatrise, and in less than a fortnight all is over.

Now it is demonstrated—

(*a*) That the aphthous virus is found in the aphthæ.

(*b*) That it persists for about four days ; after which sick animals are no longer infectious, nor are they capable of spreading the malady.

(*c*) That the aphthous virus is found throughout the animal system, and particularly in the blood, but

(*d*) That it is found and only lives in the blood during the febrile pre-eruptive period, that is only during the twenty-four to thirty-six hours of fever which precedes the crop of secondary aphthæ.

We know now where we can procure aphthous virus. Two sources offer themselves : the aphtha and the blood. The blood is chosen because of its abundant pure source, where the virus is very fortunately diluted and at the disposal of everybody. But in introducing it into animals that have never had the malady it must be observed—

(*a*) That introduced into the thickness of the skin, or mucosæ, (i.e. into the dermis), or into a muscle, or directly into the blood, the virus causes a malady in all respects similar to the natural disease, with its consequences, risks of complication, or malignity.

(*b*) That introduced in a certain dose into the subcutaneous conjunctive tissue the virus, on the contrary, regularly produces a benign malady, with a few ephemeral aphthæ in the mouth.

(*c*) That this benign malady is sufficient to immunise animals, that is to say to preserve them from a natural attack ; in other words to vaccinate them.

Vaccination produces aphthæ in the mouth which may be a source of contagion. This is inconvenient, but the risk ought not to be exaggerated. It is limited to about four days and isolation of the animals during this period is possible. It is better than running the risk of a natural attack of the malady.

The aphthous virus is quite capable of penetrating and reproducing itself in birds which do not fail to spread it.

A more serious matter is that one operates blindly with a product of which one doesn't know the virulence, a product which cannot create any regulated degree of infection, and as a result no immunity. It is advisable then to increase the dose injected.

The virus for inoculation is easy to procure and to preserve in the laboratory, a provision sufficient for any emergency.

The duration of immunity is short—about four or five months—and after six months is exhausted. In practice an average of four months is accepted. After this time herds in infected areas must be vaccinated again. If vaccination was systematically practiced on all herds in a geographical or economic area, the benefit of the measure would last much longer and be much more important.

Another and quite different process of immunisation consists in protecting subjects from the disease by the injection of blood from animals cured of the disease.

The " humours " of cured animals have acquired new properties. Their blood injected in a very large dose, under the skin or into the vein of healthy subjects, protects these against a subsequent attack. It protects them quickly and surely and without occasioning the least trouble, without causing aphthæ and without producing risk of spreading the disease—a considerable advantage over the injection of virulent blood. It has certain drawbacks, the duration of protection does not exceed fifteen days, and protection necessitates the introduction of a considerable quantity of blood ; half a litre at least for adults, about a quarter of a litre for young animals under six months.

The interest in this product has made it a matter of consideration

whether a suitable serum could not be produced which would immunise by use of a less volume, and of which a copious reserve might be kept. The manufacture of serum is, however, very costly; the product is never very "active" and strong, it would have to be given in large doses, and there is no evidence that it would protect longer than the blood of cured animals, and for these reasons it has been put out of court.

The blood of recovered animals is very valuable, and its efficacy undoubted if it is collected from the eleventh to the eighteenth day following the appearance of the aphthæ.

Not only does it protect healthy animals (protective treatment), but it allows—injected in time and in a large dose—of sick animals being saved which are suffering from aphthous fever in a grave form (curative treatment).

It suffices for several needs, and it is to this procedure, to the exclusion of virulent blood, one ought to turn to protect calves, for these young subjects invariably present the malign (often fatal) form of the malady.

Subcutaneous injection of virulent blood in small quantity and injection of a large dose of the blood of animals cured of the disease: these are the two methods which protect healthy animals for a time from foot-and-mouth disease; and the injection of the blood of cured animals is useful also in the treatment of sick subjects.

Abstracts of Current Literature

Cameron, T. W. M., M.A., B.Sc., Ph.D., M.R.C.V.S.—Intestinal Parasites of Sheep and Other Ruminants in Scotland.—*Journal of Helminthology*, vol. i, pp. 53–60.

THIS article reports a systematic survey made of the parasites of sheep and other ruminants in Scotland in 1921–22, and gives an annotated list of parasites found. It is interesting to note that two species are recorded (*Capillaria longipes* and *Cooperia curticei*) which have not previously been found in Britain, and that two species (*C. curticei* and *Monodontus trigonocephalus*) have been collected for the first time from cattle.

Two species of *Nematodirus*, fine hair-like worms, were found to be very common—occurring sometimes in large tangled masses, but appearing to possess little pathogenicity.

Dr. Cameron reports also that the sheep Hook-worm, contrary to the prevailing belief, is also very common, and infects a large proportion of adult sheep in Scotland. In view of the probably economic importance of this, he made a geographical survey of the country,

visiting abattoirs at representative spots, and at every place obtaining hook-worm. The accompanying map shows the distribution of the worms in Scotland.

Cameron, T. W. M., M.A., B.Sc. Ph.D., M.R.C.V.S.—The Morphology of "Ollulanus Tricuspis," a Nematode Parasite of the Cat.—*Journal of Helminthology*, vol. i, pp. 157–160.

Ollulanus tricuspis is a parasite of mystery. It appears to have been seen by Leuckart in 1865, and in 1873 it attracted the interest of Cobbold, who gave some remarkable views on its life-history. Since that time it would appear to have been overlooked on account of its small size, and some French writers even were sceptical as to its existence. For the first time the worm is figured and described, and it would appear to be a peculiar form of bursate nematode having a single uterus and producing living larvæ instead of eggs. Dr. Cameron is at present engaged in following the life-history of the parasite which is stated by Cobbold to cause verminous bronchitis in cats and rats.

McKim, C. F.—To Remove Adhesive Tape.—*Veterinary Medicine*, September 1923.

It may be interesting to practitioners to know that adhesive plasters can be easily and successfully removed with applications of ethyl acetate. Apply with cotton to the back of the tape and remove. Any remnants of adhesive material will yield to a few wipes with the cotton saturated with the ethyl acetate.

Tasche, L. C.—Dystocia in an Elephant relieved with Pituitrin.—*Veterinary Medicine*, September 1923.

An exceptionally interesting case of dystocia in an elephant was handled successfully with a single hypodermic injection of pituitrin. The animal belonged to a circus which arrived at that city with an elephant that had been in labour for several days without showing any evidence of approaching delivery. On examination it was found that a man's arm is pretty short for elephant obstetrics. As it was only possible to touch the fœtus with the finger tips the kind of presentation could not be determined. A very bad odour emanated from the vagina and from the arm used in the examination, indicating a rather serious state of affairs.

The entire pituitrin supply of the town was commandeered and injected subcutaneously behind the shoulder, after experiencing some difficulty in penetrating the tough hide of the patient. The dose was approximately 1 ounce.

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The doctor instructed the keeper to await his return two hours later, when he would decide upon further treatment.

Returning at the hour agreed, he found a dead 400-pound fœtus had been delivered thirty minutes after pituitrin had been injected, and the mother apparently a well elephant. There were no subsequent complications.

Tuberculosis in Swine increasing.—*Veterinary Medicine*, September 1923.

ACCORDING to the records of the Federal Meat Inspection Division of the B.A.I., one hog in each seven slaughtered during 1922 in abattoirs where there is federal inspection showed lesions of tuberculosis. Approximately 39½ million swine were slaughtered under federal inspection in 1922, and 5,640,000 showed lesions of the disease. Swine become infected with the tubercle bacilli primarily by following cattle or by consuming milk or milk products from infected sows. Fortunately, the tuberculous lesions of swine are usually localised because of the fact that swine are fed for only a short period, and the majority of them are slaughtered before they are one year of age.

It has been estimated that over $2,000,000 worth of pork products were condemned in 1922 because of tuberculosis. The economical significance of this disease should be appreciated not only by veterinarians but also by swine breeders. These facts should be a stumulus to tuberculosis eradication in cattle. A few feeders are now suggesting this loss be prevented by testing all steers and eliminating reactors from the feed lots.

Coogle, C. P.—A Preliminary Report on the Use of Creosote Oil as a Mosquito Repellant (*Public Health Reports, U.S.A.*, xxxviii, No. 10, March 9, 1923, p. 443).—*Journal R.A.M.C.*, September 1923.

OBSERVATIONS made indicate that creosote oil, when applied to the walls and ceilings of certain houses in the quantity of 1 gallon to 420 square feet, will noticeably repel anopheline mosquitoes. The duration of its effectiveness is yet to be determined.

Observations made of certain of the creosoted houses ten weeks after the creosote had been applied seem to indicate that the creosote oil was still effective.

It appears that creosote oil as a mosquito repellent is particularly applicable to and desirable for use in houses of poor construction, where screening and other anti-mosquito measures cannot be effectively employed.

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Apparently the employment of creosote oil in the quantity and manner indicated above is perfectly safe. No ill effects were noted upon any of those who slept in the rooms subsequent to the application.

One observation seems to indicate that creosote may be used to prevent mosquitoes from laying eggs in water barrels. A water barrel that had formerly contained creosote was on several visits found to be free from larvæ, although they were very abundant in two adjoining barrels. There was no film on the water at the time, but a faint odour of creosote was perceptible. The occupant of the house, a negro woman, stated that there had never been any wiggletails in the third barrel since she brought it home four years ago, when it had been given her by a man who had used it for creosote.

Esty, J. Russell.—The Heat Resistance of "Bacillus botulinus" Spores.—*Abstracts of Bacteriology*, vol. vii, 1923, No. 1, p. 16.

THE heat resistance of 112 strains of *B. botulinus*, including 81 Type A, 30 Type B, and 1 non-toxic strain, varies from 3 to 75 minutes at 105° C. The spores are produced in pea-peptic-digest pH 8·0 and heated in a phosphate solution of approximately pH 7·0. The strains originated from 29 outbreaks of human botulism and 16 outbreaks of animal botulism, in addition to numerous other sources, such as suspected canned foods, raw plant products, soil specimens, and material from forage poisoning cases.

The heat resistance of 81 Type A strains varies 3 to 75 minutes at 105° C. with an average resistance of 41·1 minutes. The resistance of 30 Type B strains varies from 3 to 60 minutes at the same temperature with an average of 23·8 minutes. The resistance of one non-toxic strain is 30 minutes.

The maximum heat resistance of *B. botulinus* spores produced under optimum conditions of growth is 330 minutes at 100° C.; 110 at 105° C.; 33 at 110° C.; 11 at 115° C., and 4 at 120° C., when heated in a phosphate solution of pH 7·0. These figures represent the time in minutes at which no spores have survived. The longest survival time at the same temperatures and under identical conditions is as follows: 320, 100, 30, 10, and 4 minutes respectively.

Spores of *B. botulinus* are more heat-resistant than those of the other anaerobes thus far tested.

The heat resistance of different strains of *B. botulinus* varies irrespective of the numbers of spores produced in the same medium. Few spores of certain strains may be far more heat-resistant than large numbers of other strains.

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The heat-resistance of the same strain is markedly influenced by the number of spores heated. The larger the number present in a suspension, the greater the resistance.

Ball, Douville, and C. Lombard (Lyons Veterinary School).—**An Enormous Seminoma in the Horse.**—*Recueil de Médecine Vétérinaire*, July 30, 1923.

EPITHELIOMAS of the testicle present two histological varieties : *seminiferous epithelioma* or *seminoma* and Wolffian epithelioma.

In the statistics of cancer by E. Césari (1922) epithelioma of the testicle figures in the proportion of 1·33 per 100 cases of epithelial cancer in the horse. The large majority of epitheliomas of the testicle in animals as in man are seminomas. They are met with also in the horse and dog. They are also known in the bull and bullock, but they are rare in the cat, doubtless on account of its early and systematic castration.

Seminomas have been made the object of special study by Petit, Peyrou, and Masson. One of us, M. Ball, has made special studies on different cases collected from the horse and dog by Peuch and Cadéac. Seminomas grow slowly, and the testicle invaded may reach enormous size, although neither cancerous cachexia nor metastases may exist, as this case shows. But in some cases the tumour gives rise to glandular or visceral metastases.

The horse here concerned was seventeen years old. The tumour affected the left testicle and was associated with inguinal hernia. The general state of the subject was good. No appearance of cachexia, no metastasis at the autopsy. The cancer began six or seven years previously.

The cancerous testicle was enormous and weighed nearly 5 pounds. The general shape of the organ was preserved by regular growth of the parts. It measured about 9 inches long, 7 inches high, and 5 inches wide. The surface was irregular, slightly bosselated, and numerous dilated and tortuous veins could be seen. Section showed lobules separated and united by a light conjunctive stroma. The colour was a yellowish red. There was some opacity and evidence of *necrosis*. On the upper border there were slight remains of testicular tissue.

In histological sections there were neoplastic cells, recalling the elements of normal seminal epithelium, and notably *spermatogoines* and *spermatocytes*.

In certain parts there was infiltration of cells into a more or less alveolar stroma characteristic of *cancer*.

Emoto, O.—Lumbar Paralysis of Goats.—*Journ. Japan Soc. let. Science,* 1 (1922), No. 1.

DR. EMOTO has found that lumbar paralysis of goats is an infectious disease caused by a streptococcus. He found it to be a spinal meningitis followed by sclerosis of the cord.

Outbreak of Glanders in Chicago.—*Veterinary Medicine,* September 1923.

FOR the first time in over fifteen years glanders has become seriously prevalent among Chicago horses, owing, it is said, to the carelessness of a certain owner of saddle horses, who is alleged to have been indifferent to the matter of employing a competent veterinary service to look after mounts stabled in different parts of the city and rented out to be ridden unhindered through the bridle paths and streets. The evidence indicates that horses affected with clinical glanders circulated among the other mounts of the parks and highways for a long time before the nature of the disease was discovered.

That such a condition could develop at this day and age in a city where good veterinary service is available is almost inconceivable, and the havoc of it all is only lessened by the spareness of the animal population as compared with that of former years when horses were more agglomerated, and when such carelessness would have meant a great deal more to the people than it does to-day. The moral is that eternal vigilance against this disease must continue as of old to make the ownership of horses safe in the large centres of population.

Löffler.—Concerning Carriers in Aphthous Fever.—*Berliner Tierärtzliche Wochenschrift,* No. 3, 1924, p. 28.

THIS investigator states:—

1. One of the most important results of investigation into foot-and-mouth disease is the establishment of the fact that as in numerous infectious diseases of man, carriers also occur in foot-and-mouth disease.

2. The number of carriers appears to be small.

3. How long the carrier can void the virus is not yet determined. According to present experiences new infection can be spread by it seven months after it has apparently recovered.

4. A method of determining the carrier is not as yet known.

5. Animals through the malady should be watched for at least seven months; they must not be bought or sold, and must be kept separate from healthy animals.

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6. If isolation is not possible, healthy animals must be protected by serum injection.

Löffler leaves it uncertain as to where the virus in the carrier is retained, whether in the oral or nasal cavities or in the pharynx and throat.

Lang, Dr. Otto.—The Significance of the Time of Copulation in Œstrum of the Nanny Goat.—*Inang. Dissert*, Berlin, 1921.

L. HAS observed that the space of time between the first noted signs of œstrum and the covering act in the goat has a considerable influence on the sex of the kids born. If this occurred within and up to the twentieth hour of œstrum there was a preponderance of male kids, as also between the twentieth and twenty-fourth hour; after the twenty-fourth hour there was a considerable percentage of female kids born. Copulation up to the twenty-fourth hour of œstrum produced 86·5 per cent. of male kids; if the nanny was covered twenty-four hours after sign of œstrum 76·9 per cent. of female kids were born.

Reviews

Traité de Therapeutique Chirurgicale des Animaux Domestiques (Surgical Therapeutics of the Domestic Animals). By P. J. CADIOT and J. ALMY, Professors at the Alfort School. Third edition, by M. CADIOT, Director of the Alfort School, Member of the Academy of Medicine. Vol. I. Paris. Vigot Frères, Editors, 23, Rue de l'Ecole de Médecine. A volume in octavo, bound in boards, pp. xvi + 980, with 314 figures in the text. Price, 50 francs.

The object of the authors of this first volume of a book that has gone into its third edition, is to give in a single work the essentials of surgical pathology and operative medicine and to specify the methods of treatment of all the surgical affections of the principal domestic animals. The volume is divided into four parts: General surgery (including anæsthesia), affections common to all the tissues, affections of tissues, and ailments of certain regions and organs of the head and throat. The book needs a lot of close reading and is essentially more a work of reference than a text-book. The exact and quick perusal of it is not aided by an index, and yet "the more voluminous and more miscellaneous the author, the greater is the need of a full and analytical index." Perhaps when the last volume of the work appears a good index will be appended, but in the meantime we shall all be getting much older. The casting of animals and employment of local and general anæsthesia is dealt with comprehensively, and we note that *sulphonal* is commented on, and *chloroform for cattle* mentioned, but not recommended. We think that lack of full statistics in the latter matter

is more accountable for this surmise than real experience. Interesting sections are those on *hydrotherapy* and *autoplasty*, and *antisepsis* and surgical *asepsis* are carefully considered. Traumatic lesions and their complications and appropriate treatment are well dealt with in affections common to all the tissues, but one of the commonest tumours attacking the parts, v.z. *botryomycosis*, seems to be omitted from the tissue list.

Surgical diseases of the nose, lips, sinuses, eyes, ears, teeth, Eustachian tube, and guttural pouches, are all discussed; and dental affections and instruments receive consideration.

With regard to the dental instruments illustrated, a few of them, at the present day, seem ancient and over heavy. The fiddling about in a horse's mouth with a galaxy of heavy and complicated instruments when the patient is on its feet is easy enough to illustrate, but only pretty from an artistic point of view. Besides, extraction of molars in this country necessitates, according to law, a general anæsthesia.

The bibliographies in the volume are very praiseworthy.

There is no doubt that the teachings of the authors are methodical, complete, and up to date, and to surgeons the matter published is of deep interest and cardinal importance.

Much of the text has been written in the light of the huge field that the Great War gave, and one has only to compare this volume with many that have preceded it to learn how tremendous the advances in surgery have recently been. The book is tastefully and serviceably bound and well printed. G. M.

Poultry Diseases, including Diseases of other Domesticated Birds. With a chapter on the Anatomy of the Fowl, by B. F. KAUPP, B.S., M.S., D.V.M., Pathologist and Poultry Investigator, Animal Industry Division, North Carolina Experiment Station and Agricultural College. Third edition, revised and enlarged. Crown 8vo, pp. 342; figs. in text 134. Publishers, Baillière, Tindall and Cox, 8, Henrietta Street, London. Price, 16s. net.

Poultry-keepers and veterinarians owe an eternal debt of gratitude to Dr. Kaupp for lifting the science and literature of poultry diseases from the realms of guesswork and obscurity to the light of well-reasoned and conducted research and sound and illuminating letterpress. Those of us who have lamented the want of such a book, and those of us who conduct many fowl post-mortems annually, know the great value of Dr. Kaupp's work. The fact that the text-book has run into its third edition is sufficient proof that it was needed and is authoritative.

There are twenty comprehensive and well-written chapters in the book dealing with anatomy, sanitation, external and internal parasites, diseases of the digestive tract, bacterial and constitutional diseases, diseases of respiratory passages, liver, ovary and oviduct, general diseases, tumours, diseases of brain and nerves, bacteria of intestines, composition of egg malformations, fractures, wounds and anæsthesia, caponing, foods poisonous to fowls, and poultry remedies.

The importance of proper sanitation is stressed and the lines on the disposal of dead and sick birds are of first-rate significance. Not a few

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of the post-mortems we make at this time of the year disclose gizzards and crops impacted with masses of felted, mud-sodden grass and obstinate constipation as a sequel. The articles on coccidiosis and black head are quite classics in their way, and tuberculosis is given the prominence and full consideration that it deserves. The author considers that human beings, tuberculous birds, and cattle may introduce the disease into a flock. With regard to *ringworm* we do not think that this in fowls is due to *Achorion Schonleinii*, but to *Epidermophiton Gallinae* and of vegetable origin (P. A. Pesce, Hutyra and Marek, Mégnin, Brumley). In post-mortems one frequently finds a white deposit reflected prominently over a good part of the heart surface, and it is sometimes difficult to diagnose whether this is due to *tuberculosis* or *aspergillosis*, or some other disease, especially when the heart only has been sent for examination. It is a condition quite peculiar to fowls. The list of remedies given at the end of the book is a very useful one, but would benefit by the addition of catechu and citrate of iron. Buttermilk, too, deserves mention as a treatment for coccidiosis. Recent research conducted in Canada places it before either hydrochloric acid or catechu in the treatment of this complaint. The illustrations in the book are beautifully done and quite numerous, and the binding and size of the manual make it very serviceable and handy. G. M.

Correspondence

FOOT-AND-MOUTH DISEASE.

To the Editor of the VETERINARY JOURNAL.

DEAR SIR,

Whilst congratulating you on your special "Foot-and-Mouth Disease" number for March, I should specially like to call attention to some of the points made by various writers as to *the variation in virulency* of the causative agent of this disease.

Mr. Francis A. Davidson, in his highly interesting article on "Trypan Blue Injections in Foot-and-Mouth Disease," mentions the matter on several occasions in his article.

It is the diminishing virulency of the causative factor at the tail-end of outbreaks that I now wish to emphasise.

Mr. Davidson's first mention of this is on page 115, where he tells us of his attempts to spread the disease as quickly as possible in one shed. He says: "This was often very prolonged, especially towards the end of an outbreak." On page 116 he says: "The course of the disease is variable, the virulence decreasing with the age of the outbreak, and the length of the incubation period may be as short as thirty-six hours in the first cases, and after a few weeks extend to seven days." Again, on the same page, Mr. Davidson says: "I shall not refer to symptoms at any great length except as regards those found when the virulency of the outbreak is on the wane." On page 117 he again says: "Also when at the tail-end of an outbreak some of the symptoms disappear, and one may be entirely misled."

Dr. J. Arkwright, in his article in the *Lancet*, February 2, 1924, remarks on the tendency for the virus to die out during the experimental passage.

These several paragraphs particularly drew my attention because, whilst on service in France and in Veterinary charge of the Infantry Transport horses of a battalion of Guards, an outbreak of contagious stomatitis with vesicular and ulcer formation resembling the mouth lesions of foot-and-mouth disease in cattle broke out amongst them.

At first by isolation I attempted to confine the disease to one section only of the horses. Finding this impracticable, it was decided to infect the remainder and thus hasten the passage of the disease through them all, as it was keeping the battalion out of action. It had been previously noted that the virulency of the disease was quickly diminishing, but much to my surprise I found that I could not infect the remainder of the horses; although, after smearing the mouth with virulent saliva, scarification in addition was tried.

This leads up to the following conjecture: Can it be possible that the causative agents of some of the ultra-visible diseases lead a dual life, one within the body and the other a saprophytic existence outside the body? and that during this external stage the causative factor recovers its virulence?

Otherwise it would seem reasonable to deduce that the disease would die out if transmitted only through the living body.

Yours truly,

Wincanton
April, 1924.

W. S. Stevens,
M.R.C.V.S.

Personal

Mr. Dalling, M.R.C.V.S., and Mr. Allen, M.R.C.V.S., who are in charge of research in the Veterinary Department at the Wellcome Physiological Research Laboratories, Langley Court, Beckenham, Kent, would be grateful to veterinary colleagues for pathological materia from any forms of chick diarrhœa and also from blackleg in cattle or sheep.

Dr. Stanley Griffith, the Field Research Laboratory, Cambridge, particularly desires to obtain specimens of equine tuberculosis.

NOTICES

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